

WHAT IS CLAIMED IS:

1. An energy trap piezoelectric resonator component utilizing third overtone of a thickness longitudinal vibration, comprising:
  - a piezoelectric substrate having first and second major surfaces and polarized in a direction of thickness between the first and second major surfaces;
  - a first vibrating electrode disposed on a portion of the first major surface of the piezoelectric substrate; and
  - a second vibrating electrode disposed on a portion of the second major surface of the piezoelectric substrate and facing the first vibrating electrode with the piezoelectric substrate interposed therebetween; wherein
  - each of the first and second vibrating electrodes has a substantially elliptical shape, and wherein a flattening ratio  $a/b$  is within a range of about 1.2 to about 1.45, where  $a$  represents the major axis diameter of the substantially elliptical shape and  $b$  represents the minor axis diameter of the substantially elliptical shape; and
  - first and second casing substrates respectively laminated on top and bottom surfaces of the piezoelectric substrate, wherein vibrating cavities are provided between the first vibrating electrode and the first casing substrate and between the second vibrating electrode and the second casing substrate.
2. An energy trap piezoelectric resonator component according to claim 1, wherein each of the first and second major surfaces has a substantially rectangular shape defined by a pair of longer sides and a pair of shorter sides and the minor axis of the substantially elliptical shape of each of the first and second vibrating electrodes is substantially in parallel with the shorter side of the piezoelectric substrate.
3. An energy trap piezoelectric resonator component according to Claim 1, further comprising:

a first extension electrode connected to the first vibrating electrode on the first major surface of the piezoelectric substrate and extending toward the periphery of the first major surface; and

a second extension electrode connected to the second vibrating electrode on the second major surface of the piezoelectric substrate and extending toward the periphery of the second major surface; wherein

a line width of each of the first and second extension electrodes is narrower than a minor axis diameter of each of the first and second vibrating electrodes.

4. An energy trap piezoelectric resonator component according to claim 1, wherein the first and second casing substrates have recesses on the respective surfaces thereof facing the energy trap piezoelectric resonator to ensure that the vibration of a vibrating section having the first and second vibrating electrodes facing each other is not restricted.

5. An energy trap piezoelectric resonator component according to claim 1, further comprising a first adhesive layer between the first casing substrate and the piezoelectric resonator, and a second adhesive layer between the second casing substrate and the piezoelectric resonator, wherein the first and second adhesive layers respectively bond the first and second casing substrates to the piezoelectric resonator, and each of the first and second adhesive layers has a substantially rectangular frame and a vibrating section where the first and second vibrating electrodes face each other is arranged within openings of the substantially rectangular frames.

6. An energy trap piezoelectric resonator component according to claim 1, further comprising a frame-shaped damping member arranged on the periphery of at least one of the major surfaces of the piezoelectric substrate.

7. An energy trap piezoelectric resonator component according to claim 2, wherein the first vibrating electrode, the first extension electrode, the second vibrating

electrode, and the second extension electrode are made of an alloy containing nickel, chromium, and silver.

8. An energy trap piezoelectric resonator component according to claim 1, wherein the first and second casing substrates are made of one of an insulating ceramic and a synthetic resin.

9. An energy trap piezoelectric resonator component according to claim 6, wherein the damping member is made of an epoxy resin.

10. An energy trap piezoelectric resonator component according to claim 5, further comprising a frame-shaped damping member arranged on the periphery of at least one of the major surfaces of the piezoelectric substrate, wherein the damping member is made of a material that has a higher elastic modulus than that of the first and second adhesive layers.

11. An energy trap piezoelectric resonator component according to claim 10, wherein the damping member and the adhesive layer have a total thickness of about  $\lambda/4$  where  $\lambda$  represents the wavelength of the fundamental wave of the thickness longitudinal vibration.

12. An energy trap piezoelectric resonator component according to claim 6, wherein the damping member has a thickness of about 40  $\mu\text{m}$  or more.